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Recommendation of the Immunization Practices Advisory Committee (ACIP)

Recommendations for Protection Against Viral Hepatitis

*The following statement updates all previous recommendations on use of immune globulins for protection against viral hepatitis (*MMWR *1981;30:423-35) and use of hepatitis B vaccine and hepatitis B immune globulin for prophylaxis of hepatitis B (*MMWR *1982;31:317-28 and* MMWR *1984;33:285-90).*

INTRODUCTION

The term "viral hepatitis" is commonly used for several clinically similar diseases that are etiologically and epidemiologically distinct (*1*). Two of these, hepatitis A (formerly called infectious hepatitis) and hepatitis B (formerly called serum hepatitis) have been recognized as separate entities since the early 1940s and can be diagnosed with specific serologic tests. The third, currently known as non-A, non-B hepatitis, is probably caused by at least two different agents, and lacking specific diagnostic tests, remains a disease diagnosed by exclusion. It is an important form of acute viral hepatitis in adults and currently accounts for most post-transfusion hepatitis in the United States. An epidemic type of non-A, non-B hepatitis, which is probably spread by the fecal-oral route and is different from the types seen in the United States, has been described in parts of Asia and North Africa (*2*).

A fourth type of hepatitis, delta hepatitis, has recently been characterized as an infection dependent on hepatitis B virus. It may occur as a coinfection with acute hepatitis B infection or as superinfection of a hepatitis B carrier (*3*).

HEPATITIS SURVEILLANCE

Approximately 21,500 cases of hepatitis A, 24,300 cases of hepatitis B, 3,500 cases of non-A, non-B hepatitis, and 7,100 cases of hepatitis type unspecified were reported in the United States in 1983. Most cases of each type occur among young adults. Since reporting from many localities is incomplete, the actual number of hepatitis cases occurring annually is thought to be several times the reported number.

IMMUNE GLOBULINS

Immune globulins used in medical practice are sterile solutions of antibodies (immunoglobulins) from human plasma. They are prepared by cold ethanol fractionation of large plasma pools and contain 10%-18% protein. In the United States, plasma is primarily obtained from professional donors. Only plasma shown to be free of hepatitis B surface antigen (HBsAg) is used to prepare immune globulins.

Immune globulin (IG) (formerly called "immune serum globulin," ISG, or "gamma globulin") produced in the United States contains antibodies against the hepatitis A virus (anti-HAV) and the hepatitis B surface antigen (anti-HBs). Tests of IG lots prepared since 1977 indicate that both types of antibody have uniformly been present. Hepatitis B immune globulin (HBIG) is an IG prepared from plasma containing high titers of anti-HBs.

ACIP: Viral Hepatitis – Continued

Neither IG nor HBIG commercially available in the United States transmits hepatitis or other viral infections. There is no evidence that the causative agent of AIDS (human T-lymphotropic virus type III/lymphadenopathy-associated virus [HTLV-III/LAV]) has been transmitted by IG or HBIG (*4*).

Serious adverse effects from immune globulins administered as recommended have been exceedingly rare. Standard immune globulins are prepared for intramuscular use and should not be given intravenously. Two preparations for intravenous use in immunodeficient and other selected patients have recently become available in the United States but are not recommended for hepatitis prophylaxis. Immune globulins are not contraindicated for pregnant women.

HEPATITIS A

Hepatitis A is caused by the hepatitis A virus (HAV), a 27-nm ribonucleic acid (RNA) agent that is a member of the picornavirus family. The illness caused by HAV characteristically has an abrupt onset with fever, malaise, anorexia, nausea, abdominal discomfort, and jaundice. Severity is related to age. In children, most infections are asymptomatic, and illness is usually not accompanied by jaundice. Most infected adults become symptomatically ill with jaundice. Fatality among reported cases is infrequent (about 0.6%).

Hepatitis A is primarily transmitted by person-to-person contact, generally through fecal contamination. Transmission is facilitated by poor personal hygiene, poor sanitation, and intimate (intrahousehold or sexual) contact. Common-source epidemics from contaminated food and water also occur. Sharing utensils or cigarettes or kissing are not believed to transmit the infection.

The incubation period of hepatitis A is 15-50 days (average 28-30). High concentrations of HAV (10^8 particles/g) are found in stools of infected persons. Fecal virus excretion reaches its highest concentration late in the incubation period and early in the prodromal phase of illness, and diminishes rapidly once jaundice appears. Greatest infectivity is during the 2-week period immediately before the onset of jaundice. Viremia is of short duration; virus has not been found in urine or other body fluids. A chronic carrier state with HAV in blood or feces has not been demonstrated. Transmission of HAV by blood transfusion has occurred but is rare.

The diagnosis of acute hepatitis A is confirmed by finding IgM-class anti-HAV in serum collected during the acute or early convalescent phase of disease. IgG-class anti-HAV, which appears in the convalescent phase of disease and remains detectable in serum thereafter, apparently confers enduring protection against disease. Commercial tests are available to detect IgM anti-HAV and total anti-HAV in serum.

Although the incidence of hepatitis A in the United States has decreased over the last 15 years, it is still a common infection in older children and young adults. About 38% of reported hepatitis cases in this country are attributable to hepatitis A.

Recommendations for IG prophylaxis of hepatitis A. Numerous field studies conducted in the past 4 decades confirm that IG given before exposure or during the incubation period of hepatitis A is protective against clinical illness (*5-7*). Its prophylactic value is greatest (80%-90%) when given early in the incubation period and declines thereafter (*7*).

Preexposure prophylaxis. The major group for whom preexposure prophylaxis is recommended is international travelers. The risk of hepatitis A for U.S. citizens traveling abroad varies with living conditions, incidence of hepatitis A infection in areas visited, and length of stay (*8,9*). In general, travelers to developed areas of western Europe, Japan, and Australia are at no greater risk of infection than in the United States. In contrast, travelers to developing

ACIP: Viral Hepatitis — Continued

countries may be at significant risk of infection. In such areas, the best way to prevent hepatitis A and other enteric diseases is to avoid potentially contaminated water or food. Drinking water (or beverages with ice) of unknown purity and eating uncooked shellfish or uncooked fruits or vegetables that are not peeled (or prepared) by the traveler should be avoided.

IG is recommended for travelers to developing countries if they will be eating in settings of poor or uncertain sanitation (some restaurants or homes) or will be visiting extensively with local persons, especially young children, in settings with poor sanitary conditions. Persons who plan to reside in developing areas for long periods should receive IG regularly if they anticipate exposure as described above or will be living in rural areas with poor sanitation.

For such travelers, a single dose of IG of 0.02 ml/kg is recommended if travel is for less than 2 months. For prolonged travel, 0.06 ml/kg should be given every 5 months. For persons who require repeated IG prophylaxis, screening for total anti-HAV antibodies before travel may be useful to define susceptibility and eliminate unnecessary doses of IG in those who are immune.

Postexposure prophylaxis. A serologic test for the diagnosis of acute hepatitis A is now widely available. Since only 38% of acute hepatitis cases in the United States result from hepatitis A, serologic confirmation of hepatitis A in the index case is recommended before treatment of contacts. Serologic screening of contacts for anti-HAV before giving IG is not recommended because screening is more costly than IG and would delay its administration.

IG should be given as soon as possible after exposure; giving IG more than 2 weeks after exposure is not indicated.

Specific recommendations for IG prophylaxis of hepatitis A depend on the nature of the HAV exposure:

1. *Close personal contact.* IG is recommended for all household and sexual contacts of persons with hepatitis A.
2. *Day-care centers.* Day-care facilities with children in diapers can be important settings for HAV transmission (*10-12*). IG should be administered to all staff and attendees of day-care centers or homes if: (a) one or more hepatitis A cases are recognized among children or employees; or (b) cases are recognized in two or more households of center attendees. When an outbreak (hepatitis cases in three or more families) occurs, IG should also be considered for members of households whose diapered children attend. In centers not enrolling children in diapers, IG need only be given to classroom contacts of an index case.
3. *Schools.* Contact at elementary and secondary schools is usually not an important means of transmitting hepatitis A. Routine administration of IG is not indicated for pupils and teachers in contact with a patient. However, when epidemiologic study clearly shows the existence of a school- or classroom-centered outbreak, IG may be given to those who have close personal contact with patients.
4. *Institutions for custodial care.* Living conditions in some institutions, such as prisons and facilities for the developmentally disabled, favor transmission of hepatitis A. When outbreaks occur, giving IG to residents and staff who have close contact with patients with hepatitis A may reduce the spread of disease. Depending on the epidemiologic circumstances, prophylaxis can be limited in extent or can involve the entire institution.
5. *Hospitals.* Routine IG prophylaxis for hospital personnel is not indicated. Rather, sound hygienic practices should be emphasized. Staff education should point out the risk of exposure to hepatitis A and emphasize precautions regarding direct contact with potentially infective materials (*13*).

ACIP: Viral Hepatitis – Continued

Outbreaks of hepatitis A among hospital staff occur occasionally, usually in association with an unsuspected index patient who is fecally incontinent. Large outbreaks have occurred among staff and family contacts of infected infants in neonatal intensive-care units. In outbreaks, prophylaxis of persons exposed to feces of infected patients may be indicated.

6. *Offices and factories.* Routine IG administration is not indicated under the usual office or factory conditions for persons exposed to a fellow worker with hepatitis A. Experience shows that casual contact in the work setting does not result in virus transmission.
7. *Common-source exposure.* IG might be effective in preventing foodborne or waterborne hepatitis A if exposure is recognized in time. However, IG is not recommended for persons exposed to a common source of hepatitis infection after cases have begun to occur in those exposed, since the 2-week period during which IG is effective will have been exceeded.

If a foodhandler is diagnosed as having hepatitis A, common-source transmission is possible but uncommon. IG should be administered to other foodhandlers but is usually not recommended for patrons. However, IG administration to patrons may be considered if (a) the infected person is directly involved in handling, without gloves, foods that will not be cooked before they are eaten; (b) the hygienic practices of the foodhandler are deficient; and (c) patrons can be identified and treated within 2 weeks of exposure. Situations where repeated exposures may have occurred, such as in institutional cafeterias, may warrant stronger consideration of IG use.

For postexposure IG prophylaxis, a single intramuscular dose of 0.02 ml/kg is recommended.

HEPATITIS B

Hepatitis B virus (HBV) infection is a major cause of acute and chronic hepatitis, cirrhosis, and primary hepatocellular carcinoma worldwide. The frequency of HBV infection and patterns of transmission vary markedly in different parts of the world. In the United States, western Europe, and Australia, it is a disease of low endemicity, with only 0.1%-0.5% of the population being virus carriers and infection occurring primarily during adulthood. In contrast, HBV infection is highly endemic in China and Southeast Asia, sub-Saharan Africa, most Pacific islands, and the Amazon Basin; in these areas, 5%-15% of the population carry the virus, and most persons acquire infection at birth or during childhood. In other parts of the world, HBV is moderately endemic, and 1%-4% of persons are HBV carriers. Recommendations for prophylaxis of hepatitis B will vary in accordance with local patterns of HBV transmission. The recommendations that follow are intended for use in the United States.

Hepatitis B infection is caused by the HBV, a 42-nm, double-shelled deoxyribonucleic acid (DNA) virus. Several well-defined antigen-antibody systems have been associated with HBV infection (Table 1). HBsAg, formerly called "Australia antigen" or "hepatitis-associated antigen," is found on the surface of the virus and on accompanying 22-nm spherical and tubular forms. HBsAg can be identified in serum 30-60 days after exposure to HBV and persists for variable periods. The various subtypes (adr, adw, ayw, ayr) of HBsAg provide useful epidemiologic markers. Antibody against HBsAg (anti-HBs) develops after a resolved infection and is responsible for long-term immunity. Anti-HBc, the antibody to the core antigen (an internal component of the virus), develops in all HBV infections and persists indefinitely. IgM anti-HBc appears early in infection and persists for 6 or more months; it is a reliable marker of acute or recent HBV infection. The hepatitis B e antigen (HBeAg) is a third antigen, presence of which correlates with HBV replication and high infectivity. Antibody to HBeAg (anti-HBe) develops in most HBV infections and correlates with lower infectivity.

ACIP: Viral Hepatitis – Continued

The onset of acute hepatitis B is generally insidious. Clinical symptoms and signs include various combinations of anorexia, malaise, nausea, vomiting, abdominal pain, and jaundice. Skin rashes, arthralgias, and arthritis can also occur. Overall fatality rates for reported cases generally do not exceed 2%. The incubation period of hepatitis B is long—45-160 days (average 60-120).

TABLE 1. Hepatitis nomenclature

Abbreviation	Term	Comments
	Hepatitis A	
HAV	Hepatitis A virus	Etiologic agent of "infectious" hepatitis; a picornavirus; single serotype.
Anti-HAV	Antibody to HAV	Detectable at onset of symptoms; lifetime persistence.
IgM anti-HAV	IgM class antibody to HAV	Indicates recent infection with hepatitis A; positive up to 4-6 months after infection.
	Hepatitis B	
HBV	Hepatitis B virus	Etiologic agent of "serum" or "long-incubation" hepatitis; also known as Dane particle.
HBsAg	Hepatitis B surface antigen	Surface antigen(s) of HBV detectable in large quantity in serum; several subtypes identified.
HBeAg	Hepatitis B e antigen	Soluble antigen; correlates with HBV replication, high titer HBV in serum, and infectivity of serum.
HBcAg	Hepatitis B core antigen	No commercial test available.
Anti-HBs	Antibody to HBsAg	Indicates past infection with and immunity to HBV, passive antibody from HBIG, or immune response from HBV vaccine.
Anti-HBe	Antibody to HBeAg	Presence in serum of HBsAg carrier suggests lower titer of HBV.
Anti-HBc	Antibody to HBcAg	Indicates past infection with HBV at some undefined time.
IgM anti-HBc	IgM class antibody to HBcAg	Indicates recent infection with HBV; positive for 4-6 months after infection.
	Delta hepatitis	
δ virus	Delta virus	Etiologic agent of delta hepatitis; may only cause infection in presence of HBV.
δ-Ag	Delta antigen	Detectable in early acute delta infection.
Anti-δ	Antibody to delta antigen	Indicates past or present infection with delta virus.
	Non-A, non-B hepatitis	
NANB	Non-A, non-B hepatitis	Diagnosis of exclusion. At least two candidate viruses; epidemiology parallels that of hepatitis B.
	Epidemic non-A, non-B hepatitis	
Epidemic NANB	Epidemic non-A, non-B hepatitis	Causes large epidemics in Asia, North Africa; fecal-oral or waterborne.
	Immune globulins	
IG	Immune globulin (previously ISG, immune serum globulin, or gamma globulin)	Contains antibodies to HAV, low titer antibodies to HBV.
HBIG	Hepatitis B immune globulin	Contains high titer antibodies to HBV.

ACIP: Viral Hepatitis – Continued

HBV infection in the United States. The estimated lifetime risk of HBV infection in the United States varies from almost 100% for the highest-risk groups to approximately 5% for the population as a whole. An estimated 200,000 persons, primarily young adults, are infected each year. One-quarter become ill with jaundice; more than 10,000 patients require hospitalization; and an average of 250 die of fulminant disease each year. Between 6% and 10% of young adults with HBV infection become carriers. The United States currently contains an estimated pool of 500,000-1,000,000 infectious carriers. Chronic active hepatitis develops in over 25% of carriers and often progresses to cirrhosis. Furthermore, HBV carriers have a risk of developing primary liver cancer that is 12-300 times higher than that of other persons. It is estimated that 4,000 persons die from hepatitis B-related cirrhosis each year in this country and that more than 800 die from hepatitis B-related liver cancer.

The role of the HBV carrier is central in the epidemiology of HBV transmission. A carrier is defined as a person who is HBsAg-positive on at least two occasions at least 6 months apart. Although the degree of infectivity is best correlated with HBeAg-positivity, any person positive for HBsAg is potentially infectious. The likelihood of developing the carrier state varies inversely with the age at which infection occurs. During the perinatal period, HBV transmitted from HBeAg-positive mothers results in HBV carriage in up to 90% of infected infants, whereas 6%-10% of acutely infected adults become carriers.

Carriers and persons with acute infection have highest concentrations of HBV in the blood and serous fluids; less is present in other body fluids, such as saliva and semen. Transmission occurs via percutaneous or permucosal routes. Infective blood or body fluids can be introduced by contaminated needles or through sexual contact. Infection can occur in settings of continuous close personal contact, such as in households or among children in institutions for the mentally retarded, presumably via inapparent or unnoticed contact of infectious secretions with skin lesions or mucosal surfaces. Transmission of infection by transfusion of contaminated blood or blood products has been greatly reduced since the advent of routine screening with highly sensitive tests for HBsAg. HBV is not transmitted via the fecal-oral route or by contamination of food or water.

Serologic surveys demonstrate that, although HBV infection is uncommon among adults in the general population, it is highly prevalent in certain groups. Those at risk, based on the prevalence of serologic markers of infection, are described in Table 2. Immigrants/refugees and their descendants from areas of high HBV endemicity are at high risk of acquiring HBV infection. Homosexually active men and users of illicit injectable drugs are among the highest-risk groups, acquiring infection soon after adopting these lifestyles (10%-20%/year). Inmates of prisons have high prevalence of HBV markers usually because of prior parenteral drug abuse; actual risk of transmission in prisons is also associated with parenteral drug abuse in prisons. Patients and staff in custodial institutions for the mentally retarded are also at increased risk of having HBV infection. Classroom contacts, particularly teachers or instructors, of some deinstitutionalized carriers may also be at higher risk than the general population. Household contacts and sexual partners of HBV carriers are at increased risk, as are hemodialysis patients and recipients of certain pooled plasma products.

There is increased risk for medical and dental workers and related laboratory and support personnel who have contact with blood. Employment in a hospital without exposure to blood carries no greater risk than that for the general population.

Hepatitis B prophylaxis. Two types of products are available for prophylaxis against hepatitis B. Hepatitis B vaccine, licensed in 1981, provides active immunization against HBV infection, and its use is recommended for both pre- and postexposure prophylaxis. IG products provide temporary, passive protection and are indicated only in certain postexposure settings.

ACIP: Viral Hepatitis – Continued

IG and HBIG. IG and HBIG contain different amounts of anti-HBs. IG is prepared from plasma that is not preselected for anti-HBs content. Since 1977, all lots tested have contained anti-HBs at a titer of at least 1:100 by radioimmunoassay (RIA). HBIG is prepared from plasma preselected for high-titer anti-HBs. In the United States, HBIG has an anti-HBs titer of higher than 1:100,000 by RIA. There is no evidence that the causative agent of AIDS (HTLV-III/LAV) has been transmitted by IG or HBIG (*4*).

Hepatitis B vaccine. Hepatitis B vaccine licensed in the United States is a suspension of inactivated, alum-adsorbed 22-nm surface antigen particles that have been purified from human plasma by a combination of biophysical (ultracentrifugation) and biochemical procedures. Inactivation is a threefold process using 8M urea, pepsin at pH 2, and 1:4000 formalin. These treatment steps have been shown to inactivate representatives of all classes of viruses found in human blood, including the causative agent of AIDS (HTLV-III/LAV) (*14*). HB vaccine contains 20 μg/ml of HBsAg protein.

After a series of three intramuscular doses of hepatitis B vaccine, over 90% of healthy adults develop protective antibody (*15,16*). A course of three 10-μg doses induces antibody in virtually all infants and children from birth through 9 years of age. The deltoid (arm) is the recommended site for hepatitis B vaccination in adults; immunogenicity of vaccine in adults is significantly lower when injections are given in the buttock (81%) (*17*). The immunogenicity of the intradermal route has not yet been clearly established.

Field trials of the U.S.-manufactured vaccine have shown 80%-95% efficacy in preventing infection or hepatitis among susceptible persons (*16,18*). Protection against illness is virtually complete for persons who develop adequate antibody levels* after vaccination. The duration of protection and need for booster doses are not yet defined. However, only 10%-15% of per-

*Adequate antibody is 10 or more sample ratio units (SRU) by RIA or positive by enzyme immunoassay.

TABLE 2. Prevalence of hepatitis B serologic markers in various population groups

Population group	Prevalence of serologic markers of HBV infection	
	HBsAg (%)	All markers (%)
High risk		
Immigrants/refugees from areas of high HBV endemicity	13	70-85
Clients in institutions for the mentally retarded	10-20	35-80
Users of illicit parenteral drugs	7	60-80
Homosexually active men	6	35-80
Household contacts of HBV carriers	3-6	30-60
Patients of hemodialysis units	3-10	20-80
Intermediate risk		
Health-care workers—frequent blood contact	1-2	15-30
Prisoners (male)	1-8	10-80
Staff of institutions for the mentally retarded	1	10-25
Low risk		
Health-care workers—no or infrequent blood contact	0.3	3-10
Healthy adults (first-time volunteer blood donors)	0.3	3-5

ACIP: Viral Hepatitis – Continued

sons who develop adequate antibody after three vaccine doses will lose antibody within 4 years, and among those who lose antibody, protection against viremic infection and liver inflammation appears to persist. Immunogenicity and efficacy of the licensed vaccine in hemodialysis patients is much lower than in normal adults; protection may last only as long as adequate antibody levels persist (*19*).

Vaccine usage. Primary vaccination consists of three intramuscular doses of vaccine, with the second and third doses given 1 and 6 months, respectively, after the first. Adults and older children should be given 20 μg (1.0 ml) per dose, while children under 10 years should receive 10 μg (0.5 ml) per dose. For patients undergoing hemodialysis and for other immunosuppressed patients, a 40-μg (2.0-ml) dose should be used. Vaccine doses administered at longer intervals provide equally satisfactory protection, but optimal protection is not conferred until after the third dose. Hepatitis B vaccine should only be given in the deltoid muscle in adults and children or in the anterolateral thigh muscle in infants and neonates. Since hepatitis B vaccine is an inactivated (noninfective) product, it is presumed that there will be no interference with other simultaneously administered vaccines.

Data are not available on the safety of the vaccine for the developing fetus. Because the vaccine contains only noninfectious HBsAg particles, there should be no risk to the fetus. In contrast, HBV infection in a pregnant woman may result in severe disease for the mother and chronic infection for the newborn. Pregnancy should not be considered a contraindication to the use of this vaccine for persons who are otherwise eligible.

Vaccine storage. Vaccine should be stored at 2 C-8 C (36 F-46 F) but not frozen. *Freezing destroys the potency of the vaccine.*

Side effects and adverse reactions. The most common side effect observed in prevaccination trials was soreness at the injection site. Among an estimated 750,000 vaccinees, approximately 100 episodes of severe illness have been reported after receipt of vaccine. These have included arthralgias, neurologic reactions (such as Guillain-Barré syndrome), and other illnesses. The rate of Guillain-Barré syndrome following HB vaccine does not appear to be significantly increased above that observed in normal adults. Such temporally associated illnesses are not considered to be etiologically related to hepatitis B vaccine.

Effect of vaccination on carriers and immune persons. The vaccine produces neither therapeutic nor adverse effects in HBV carriers (*20*). Vaccination of individuals who possess antibodies against HBV from a previous infection is not necessary but will not cause adverse effects. Such individuals will have a postvaccination increase in their anti-HBs levels. Passively acquired antibody, whether from HBIG or IG administration or from the transplacental route, will not interfere with active immunization (*21*).

Prevaccination serologic screening for susceptibility. The decision to screen potential vaccine recipients for prior infection depends on three variables: (1) the cost of vaccination; (2) the cost of testing for susceptibility; and (3) the expected prevalence of immune individuals in the group. Figure 1 shows the relative cost-effectiveness of screening, given different costs of screening tests and the expected prevalence of immunity. In constructing the figure, the assumption was made that the cost of three doses of vaccine is $100 and that there are additional costs for administration. For any combination of screening costs and immunity to hepatitis, the cost-effectiveness can be estimated. For example, if the expected prevalence of serologic markers for HBV is over 20%, screening is cost-effective if costs of screening are no greater than $30 per person. If the expected prevalence of markers is less than 8%, and if the costs of screening are greater than $10 per person, vaccination without screening is cost-effective.

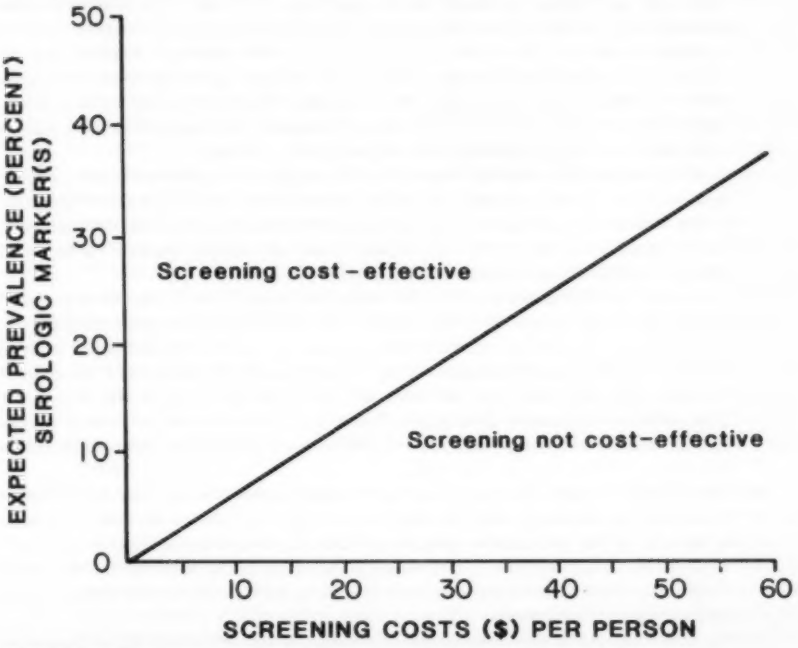
ACIP: Viral Hepatitis – Continued

Screening in groups with the highest risk of HBV infection (Table 2) will be cost-effective unless testing costs are extremely high. For groups at intermediate risk, cost-effectiveness of screening may be marginal, and vaccination programs may or may not utilize screening. For groups with a low expected prevalence of HBV serologic markers, such as health professionals in their training years, screening will not be cost-effective.

For routine screening, only one antibody test, either anti-HBc or anti-HBs, need be used. Anti-HBc will identify all previously infected persons, both carriers and noncarriers, but will not discriminate between members of the two groups. Anti-HBs will identify those previously infected, except carriers. For groups expected to have carrier rates of under 2%, such as health-care workers, neither test has a particular advantage. For groups with higher carrier rates, anti-HBc may be preferred to avoid unnecessary vaccination of carriers. If the RIA anti-HBs test is used for screening, a minimum of 10 RIA sample ratio units should be used to designate immunity (2.1 is the usual designation of a positive test). If enzyme immunoassay (EIA) is used, the manufacturers' recommended positive is appropriate.

Serologic confirmation of postvaccination immunity and revaccination of nonresponders. When given in the deltoid, hepatitis B vaccine produces protective antibody (anti-HBs) in more than 90% of healthy persons. Testing for immunity following vaccination is not recommended routinely but is advised for persons whose subsequent management depends on

FIGURE 1. Cost-effectiveness of prevaccination screening of hepatitis B virus vaccine candidates*



*See text for assumptions.

ACIP: Viral Hepatitis – Continued

knowing their immune status, such as dialysis patients and staff, and for persons in whom a suboptimal response may be anticipated, such as those who have received vaccine in the buttock.

Revaccination of persons who do not respond to primary series (nonresponders) produces adequate antibody in only one-third when the primary vaccination has been given in the deltoid. Therefore, revaccination of nonresponders to deltoid injection is not recommended routinely. For persons who did not respond to a primary vaccine series given in the buttock, preliminary data from two small studies suggest that revaccination in the arm induces adequate antibody in over 75%. Revaccination should be strongly considered for such persons.

Preexposure vaccination. Persons at substantial risk of acquiring HBV infection who are demonstrated or judged likely to be susceptible should be vaccinated. They include:

1. *Health-care workers.* The risk of health-care workers acquiring HBV infection depends on the frequency of exposure to blood or blood products and on the frequency of needlesticks. These risks vary during the training and working career of each individual but are often highest during the professional training period. For this reason, it is recommended that vaccination be completed during training in schools of medicine, dentistry, nursing, laboratory technology, and other allied health professions.

   The risk of HBV infection for hospital personnel can vary both among hospitals and within hospitals. In developing specific immunization strategies, hospitals should use available published data about the risk of infection (*22-24*) and may wish to evaluate their own clinical and institutional experience with hepatitis B. Studies in urban centers have indicated that occupational groups with frequent exposure to blood and/or needles have the highest risk of acquiring HBV infection, including (but not limited to) the following groups: medical technologists, operating room staff, phlebotomists and intravenous therapy nurses, surgeons and pathologists, and oncology and dialysis unit staff. Groups shown to be at increased risk in some hospitals include: emergency room staff, nursing personnel, and staff physicians.

   Other health-care workers based outside hospitals who have frequent contact with blood or blood products are also at increased risk of acquiring HBV infection. These include (but are not limited to): dental professionals (dentists, oral surgeons, dental hygienists), laboratory and blood bank technicians, dialysis center staff, emergency medical technicians, and morticians.
2. *Clients and staff of institutions for the mentally retarded.* Susceptible clients and staff who work closely with clients of institutions for the mentally retarded should be vaccinated. Risks for staff are comparable to those for health-care personnel in other high-risk environments. However, the risk in institutional environments is associated, not only with blood exposure, but also with bites and contact with skin lesions and other infective secretions. Susceptible clients and staff who live or work in smaller (group) residential settings with known HBV carriers should also receive hepatitis B vaccine.
3. *Hemodialysis patients.* Numerous studies have established the high risk of HBV transmission in hemodialysis units. Although recent data have shown not only a decrease in the rate of HBV infection in hemodialysis units but also a lower vaccine efficacy in these patients, vaccination is recommended for susceptible patients. Environmental control measures and regular serologic screening (based on immune status) of patients should be maintained.
4. *Homosexually active men.* Susceptible homosexually active men should be vaccinated regardless of their ages or duration of their homosexual practices. It is important to

ACIP: Viral Hepatitis — Continued

vaccinate persons as soon as possible after their homosexual activity begins. Homosexually active women are not at increased risk of sexually transmitted HBV infection.

5. *Users of illicit injectable drugs.* All users of illicit injectable drugs who are susceptible to HBV should be vaccinated as early as possible after their drug use begins.
6. *Recipients of certain blood products.* Patients with clotting disorders who receive clotting factor concentrates have an elevated risk of acquiring HBV infection. Vaccination is recommended for these persons and should be initiated at the time their specific clotting disorder is identified. Screening is recommended for patients who have already received multiple infusions of these products.
7. *Household and sexual contacts of HBV carriers.* Household contacts of HBV carriers are at high risk of acquiring HBV infection. Sexual contacts appear to be at greatest risk. When HBV carriers are identified through routine screening of donated blood, diagnostic testing in hospitals, prenatal screening, screening of refugees, or other screening programs, they should be notified of their status and their susceptible household contacts vaccinated.

   Families accepting orphans or unaccompanied minors from countries of high HBV endemicity should have the child screened for HBsAg, and if positive, family members should be vaccinated.
8. *Other contacts of HBV carriers.* Persons in casual contact with carriers at schools, offices, etc., are at minimal risk of acquiring HBV infection, and vaccine is not routinely recommended for them. However, classroom contacts of deinstitutionalized mentally retarded HBV carriers who behave aggressively or have special medical problems that increase the risk of exposure to their blood or serous secretions may be at risk. In such situations, vaccine may be offered to classroom contacts.
9. *Special high-risk populations.* Some American populations, such as Alaskan Eskimos, native Pacific islanders, and immigrants and refugees from areas with highly endemic disease (particularly eastern Asia and sub-Saharan Africa) have high HBV infection rates. Depending on specific epidemiologic and public health considerations, more extensive vaccination programs should be considered.
10. *Inmates of long-term correctional facilities.* The prison environment may provide a favorable setting for the transmission of HBV because of the frequent use of illicit injectable drugs and homosexual practices. Moreover, it provides an access point for vaccination of parenteral drug abusers. Prison officials should consider undertaking screening and vaccination programs directed at those who abuse drugs before or while in prison.
11. *Heterosexually active persons.* Heterosexually active persons with multiple sexual partners are at increased risk of acquiring HBV infection; risk increases with increasing sexual activity. Vaccination should be considered for persons who present for treatment of sexually transmitted diseases and who have histories of sexual activity with multiple partners.
12. *International travelers.* Vaccination should be considered for persons who plan to reside more than 6 months in areas with high levels of endemic HBV and who will have close contact with the local population. Vaccination should also be considered for short-term travelers who are likely to have contact with blood from or sexual contact with residents of areas with high levels of endemic disease. Hepatitis B vaccination of travelers ideally should begin 6 months before travel in order to complete the full vaccine series; however, a partial series will offer some protection against HBV infection.

ACIP: Viral Hepatitis – Continued

Postexposure prophylaxis for hepatitis B. Prophylactic treatment to prevent hepatitis B infection after exposure to HBV should be considered in the following situations: perinatal exposure of an infant born to an HBsAg-positive mother; accidental percutaneous or permucosal exposure to HBsAg-positive blood; or sexual exposure to an HBsAg-positive person.

Recent studies have established the relative efficacies of immune globulins and/or hepatitis B vaccine in various exposure situations. For perinatal exposure to an HBsAg-positive, HBeAg-positive mother, a regimen combining one dose of HBIG at birth with the hepatitis B vaccine series started soon after birth is 85%-90% effective in preventing development of the HBV carrier state (*25,27*). Regimens involving either multiple doses of HBIG alone, or the vaccine series alone, have 70%-75% efficacy, while a single dose of HBIG alone has only 50% efficacy (*28*).

For accidental percutaneous exposure or sexual exposure, only regimens including HBIG and/or IG have been studied. A regimen of two HBIG doses, one given after exposure and one a month later, is about 75% effective in preventing hepatitis B following percutaneous exposure; a single dose of HBIG has similar efficacy when used following sexual exposure (*29-31*).

(Continued on page 329)

TABLE I. Summary—cases of specified notifiable diseases, United States

Disease	22nd Week Ending			Cumulative, 22nd Week Ending		
	June 1, 1985	June 2, 1984	Median 1980-1984	June 1, 1985	June 2, 1984	Median 1980-1984
Acquired Immunodeficiency Syndrome (AIDS)	144	72	N	2,956	1,600	N
Aseptic meningitis	78	85	85	1,544	1,665	1,665
Encephalitis: Primary (arthropod-borne & unspec.)	20	15	15	368	341	341
Post-infectious	5	2	1	60	44	44
Gonorrhea: Civilian	12,438	12,203	16,749	330,873	335,310	391,294
Military	204	270	462	7,792	8,588	11,414
Hepatitis: Type A	313	379	379	8,831	8,734	9,468
Type B	454	491	396	10,354	10,451	8,772
Non A, Non B	71	81	N	1,723	1,600	N
Unspecified	90	83	153	2,273	2,018	3,551
Legionellosis	4	25	N	219	231	N
Leprosy	4	6	2	137	98	98
Malaria	17	22	26	303	316	377
Measles: Total*	55	59	59	1,235	1,476	1,476
Indigenous	50	54	N	919	1,330	N
Imported	5	5	N	316	146	N
Meningococcal infections: Total	38	46	52	1,254	1,459	1,460
Civilian	38	46	52	1,251	1,456	1,456
Military	-	-	-	3	3	7
Mumps	49	86	126	1,688	1,572	2,415
Pertussis	34	27	22	555	870	464
Rubella (German measles)	36	14	52	244	351	1,331
Syphilis (Primary & Secondary): Civilian	433	458	460	10,434	11,809	12,574
Military	2	3	3	77	145	157
Toxic Shock syndrome	5	7	N	158	202	N
Tuberculosis	288	358	493	8,320	8,671	10,460
Tularemia	5	18	4	38	65	65
Typhoid fever	13	3	6	118	133	156
Typhus fever, tick-borne (RMSF)	33	41	41	105	139	171
Rabies, animal	114	103	157	2,096	2,100	2,805

TABLE II. Notifiable diseases of low frequency, United States

	Cum. 1985		Cum. 1985
Anthrax	-	Leptospirosis (Hawaii 1)	10
Botulism: Foodborne (Calif. 1)	3	Plague	1
Infant	18	Poliomyelitis: Total	2
Other	-	Paralytic (Fla. 1)	2
Brucellosis (Tex. 7)	45	Psittacosis (Calif. 1)	52
Cholera	-	Rabies, human	-
Congenital rubella syndrome	-	Tetanus (Mo. 1)	24
Congenital syphilis, ages < 1 year	74	Trichinosis	29
Diphtheria	1	Typhus fever, flea-borne (endemic, murine)	1

*Four of the 55 reported cases for this week were imported from a foreign country or can be directly traceable to a known internationally imported case within two generations.

TABLE III. Cases of specified notifiable diseases, United States, weeks ending June 1, 1985 and June 2, 1984 (22nd Week)

Reporting Area	AIDS	Aseptic Menin-gitis	Encephalitis		Gonorrhea (Civilian)		Hepatitis (Viral), by type				Legionel-losis	Leprosy
			Primary	Post-in-fectious			A	B	NA,NB	Unspeci-fied		
	Cum. 1985	1985	Cum. 1985	Cum. 1985	Cum. 1985	Cum. 1984	1985	1985	1985	1985	1985	Cum. 1985
UNITED STATES	2,956	78	368	60	330,873	335,310	313	454	71	90	4	137
NEW ENGLAND	89	1	11	-	10,039	9,680	4	19	3	7	1	3
Maine	4	1	-	-	397	367	2	-	-	-	-	-
N.H.	-	-	3	-	210	272	-	-	-	-	-	-
Vt.	-	-	-	-	110	161	-	-	-	-	-	-
Mass.	50	-	8	-	3,762	3,947	2	10	2	6	1	3
R.I.	3	-	-	-	752	600	-	3	-	-	-	-
Conn.	32	-	-	-	4,808	4,333	-	6	1	1	-	-
MID ATLANTIC	1,187	15	57	3	46,529	46,059	28	62	7	2	-	11
Upstate N.Y.	152	1	18	2	6,705	6,922	4	12	1	1	-	-
N.Y. City	780	1	3	-	21,062	19,699	1	-	-	-	-	11
N.J.	184	10	15	-	8,528	7,557	8	20	3	1	-	-
Pa.	71	3	21	1	10,234	11,881	15	30	3	-	-	-
E.N. CENTRAL	122	8	84	13	46,561	45,072	14	25	5	-	2	3
Ohio	24	5	33	4	11,839	11,808	6	11	2	-	1	2
Ind.	4	1	13	1	4,173	5,401	2	4	1	-	-	-
Ill.	56	-	10	5	13,283	9,555	2	1	-	-	-	-
Mich.	25	2	23	-	13,244	13,127	4	9	2	-	1	1
Wis.	13	-	5	3	4,022	5,181	-	-	-	-	-	-
W.N. CENTRAL	30	3	28	3	16,603	15,744	8	7	2	1	1	-
Minn.	5	-	13	1	2,441	2,249	1	-	-	-	-	-
Iowa	3	-	9	-	1,755	1,855	-	-	1	-	-	-
Mo.	17	2	-	-	7,807	7,459	4	4	-	-	1	-
N. Dak.	-	-	-	1	117	164	-	-	-	-	-	-
S. Dak.	-	-	-	-	299	425	-	1	-	-	-	-
Nebr.	1	-	1	-	1,493	1,115	-	2	-	-	-	-
Kans.	4	1	5	1	2,691	2,477	3	-	1	1	-	-
S. ATLANTIC	399	22	39	18	72,032	85,552	21	92	12	16	-	3
Del.	7	1	1	-	1,604	1,484	1	2	-	-	-	-
Md.	49	3	11	1	11,530	9,826	1	13	3	2	-	1
D.C.	56	-	-	-	5,925	6,183	1	-	-	-	-	-
Va.	26	7	7	4	7,422	8,079	1	19	-	3	-	-
W. Va.	2	-	2	-	996	1,041	-	2	-	-	-	-
N.C.	23	2	15	-	13,739	13,528	1	7	-	2	-	1
S.C.	4	-	3	-	9,075	8,069	2	19	2	3	-	-
Ga.	71	-	-	-	-	16,991	-	-	-	-	-	-
Fla.	161	9	-	13	21,741	20,551	14	30	7	6	-	1
E.S. CENTRAL	26	5	14	4	28,502	28,592	7	62	6	1	-	-
Ky.	9	-	4	-	3,170	3,479	4	9	-	-	-	-
Tenn.	4	2	4	-	11,373	11,786	1	36	2	1	-	-
Ala.	12	2	5	4	9,246	9,288	-	12	1	-	-	-
Miss.	1	1	1	-	4,713	4,039	2	5	3	-	-	-
W.S. CENTRAL	230	7	36	1	46,841	46,175	59	46	4	11	-	12
Ark.	2	-	1	1	4,357	4,031	-	-	-	-	-	1
La.	42	-	1	-	10,295	10,325	1	8	-	1	-	1
Okla.	2	-	11	-	4,769	4,932	17	6	1	1	-	-
Tex.	184	7	23	-	27,420	26,887	41	32	3	9	-	10
MOUNTAIN	37	6	14	3	10,705	10,638	48	34	7	15	-	2
Mont.	-	-	-	-	307	477	3	-	-	-	-	-
Idaho	-	-	-	-	356	506	3	1	-	-	-	-
Wyo.	-	-	1	-	271	322	1	-	-	-	-	-
Colo.	12	-	4	-	3,321	3,077	1	3	1	3	-	-
N. Mex.	4	2	-	-	1,244	1,219	5	10	2	1	-	-
Ariz.	16	2	2	-	3,060	2,825	25	10	3	5	-	-
Utah	2	2	5	3	442	555	4	2	1	5	-	1
Nev.	3	-	2	-	1,704	1,657	6	8	-	1	-	1
PACIFIC	836	11	85	15	53,061	47,798	124	107	25	37	-	103
Wash.	41	1	8	-	3,635	3,399	4	2	1	-	-	23
Oreg.	13	-	-	-	2,658	2,662	30	5	1	2	-	2
Calif.	765	9	77	15	44,752	39,723	89	94	22	35	-	69
Alaska	2	-	-	-	1,233	1,197	-	-	-	-	-	-
Hawaii	15	1	-	-	783	817	1	6	1	-	-	9
Guam	-	U	-	-	52	99	U	U	U	U	U	-
P.R.	34	7	3	1	1,566	1,467	2	9	-	6	-	2
V.I.	2	U	-	-	193	208	U	U	U	U	U	-
Pac. Trust Terr.	-	U	-	-	146	-	U	U	U	U	U	20

N: Not notifiable U: Unavailable

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending June 1, 1985 and June 2, 1984 (22nd Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported *		Total									
	Cum. 1985	1985	Cum. 1985	1985	Cum. 1985	Cum. 1984	Cum. 1985	1985	Cum. 1985	1985	Cum. 1985	Cum. 1984	1985	Cum. 1985	Cum. 1984
UNITED STATES	303	50	919	5	316	1,476	1,254	49	1,688	34	555	870	36	244	351
NEW ENGLAND	18	-	15	-	85	88	61	1	35	1	32	17	1	7	16
Maine	2	-	-	-	-	-	2	-	5	-	2	-	-	-	1
N.H.	2	-	-	-	-	36	5	-	5	-	17	4	-	2	-
Vt.	-	-	-	-	-	4	10	-	2	-	2	8	-	-	-
Mass.	10	-	14	-	82	38	11	-	15	-	4	4	1	5	15
R.I.	1	-	-	-	-	-	9	1	4	-	4	1	-	-	-
Conn.	3	-	1	-	3	10	24	-	4	1	3	-	-	-	-
MID. ATLANTIC	50	19	95	1	20	85	209	6	183	2	57	59	21	68	109
Upstate N.Y.	17	8	46	-	9	21	87	3	103	2	24	38	-	8	79
N.Y. City	15	1	24	-	5	54	25	-	14	-	9	2	20	40	20
N.J.	5	-	2	1§	6	6	35	1	24	-	2	4	1	8	10
Pa.	13	10	23	-	-	4	62	2	42	-	22	15	-	12	-
E.N. CENTRAL	15	-	156	-	123	537	220	9	673	5	71	237	-	19	55
Ohio	3	-	-	-	42	3	71	6	200	-	15	37	-	-	2
Ind.	1	-	-	-	1	3	33	-	25	-	11	159	-	-	1
Ill.	1	-	75	-	66	158	44	-	133	-	10	18	-	5	30
Mich.	9	-	35	-	14	357	51	2	257	5	13	12	-	13	15
Wis.	1	-	46	-	-	16	21	1	58	-	22	11	-	1	7
W.N. CENTRAL	7	-	1	2	6	1	66	9	57	5	53	75	6	16	22
Minn.	1	-	-	2†	4	1	16	-	1	-	11	7	1	2	1
Iowa	1	-	-	-	-	-	7	-	7	-	3	3	-	-	-
Mo.	2	-	-	-	2	-	30	1	9	3	12	14	5	5	-
N. Dak.	1	-	-	-	-	-	-	1	2	-	6	-	-	2	3
S. Dak.	1	-	-	-	-	-	1	-	-	-	1	2	-	-	-
Nebr.	-	-	-	-	-	-	3	-	-	2	3	2	-	-	-
Kans.	1	-	1	-	-	-	9	7	38	-	17	47	-	7	18
S. ATLANTIC	39	3	148	-	6	21	234	2	133	1	110	62	-	28	18
Del.	-	-	-	-	-	-	5	-	1	-	-	-	-	-	-
Md.	10	-	16	-	4	9	29	-	18	-	30	5	-	1	1
D.C.	3	-	-	-	1	-	6	-	-	-	-	-	-	-	-
Va.	8	-	16	-	1	2	32	-	21	-	3	7	-	1	-
W. Va.	1	1	25	-	-	-	5	-	43	-	-	6	-	9	-
N.C.	4	2	3	-	-	-	33	1	9	-	8	17	-	-	-
S.C.	-	-	-	-	-	-	25	-	6	-	-	2	-	2	-
Ga.	2	-	8	-	-	-	38	-	12	-	38	6	-	4	2
Fla.	11	-	80	-	-	10	61	1	23	1	31	19	-	11	15
E.S. CENTRAL	4	1	1	-	-	3	57	-	12	-	6	5	-	1	5
Ky.	1	-	-	-	-	1	4	-	1	-	1	1	-	1	1
Tenn.	-	-	-	-	-	2	20	-	10	-	1	2	-	-	-
Ala.	2	-	-	-	-	-	19	-	-	-	2	-	-	-	1
Miss.	1	1	1	-	-	-	14	-	1	-	2	2	-	-	3
W.S. CENTRAL	23	5	79	-	7	293	111	6	188	3	65	217	1	20	6
Ark.	-	-	-	-	-	-	10	-	4	-	9	10	-	1	3
La.	-	1	10	-	-	-	18	-	2	3	5	3	-	-	-
Okla.	1	-	-	-	-	5	23	N	N	-	51	195	-	1	-
Tex.	22	4	69	-	7	288	60	6	182	-	-	9	1	18	3
MOUNTAIN	15	17	335	1	44	114	63	3	168	4	32	59	-	4	11
Mont.	-	-	123	-	17	-	4	-	6	-	3	16	-	-	-
Idaho	1	10	57	-	20	-	2	-	5	-	-	2	-	1	1
Wyo.	-	-	-	-	-	-	5	-	2	-	-	3	-	-	2
Colo.	5	-	-	1†	6	-	17	1	15	-	10	21	-	-	2
N. Mex.	4	-	1	-	1	87	8	N	N	-	4	5	-	2	-
Ariz.	3	7	154	-	-	-	18	2	79	4	9	8	-	1	-
Utah	1	-	-	-	-	27	7	-	2	-	6	2	-	-	6
Nev.	1	-	-	-	-	-	2	-	59	-	-	2	-	-	-
PACIFIC	132	5	89	1	25	334	233	13	239	13	129	139	7	81	109
Wash.	11	-	1	-	-	81	38	1	14	2	20	19	-	2	1
Oreg.	5	-	3	-	-	-	24	N	N	-	16	9	-	2	-
Calif.	99	2	77	1†	21	244	163	12	214	10	87	48	2	49	106
Alaska	2	-	-	-	-	-	5	-	2	1	3	-	-	1	-
Hawaii	15	3	8	-	4	9	3	-	9	-	3	63	5	27	2
Guam	-	U	10	U	-	84	-	U	4	U	-	-	U	1	3
P.R.	-	-	46	-	-	1	7	9	83	-	2	-	10	19	5
V.I.	-	U	4	U	6	-	-	U	3	U	-	-	U	-	-
Pac. Trust Terr.	-	U	-	U	-	-	-	U	3	U	-	-	U	-	-

*For measles only, imported cases includes both out-of-state and international importations.

N: Not notifiable U: Unavailable †International §Out-of-state

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending June 1, 1985 and June 2, 1984 (22nd Week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1985	Cum. 1984	1985	Cum. 1985	Cum. 1984	Cum. 1985	Cum. 1985	Cum. 1985	Cum. 1985
UNITED STATES	10,434	11,809	5	8,320	8,671	38	118	105	2,096
NEW ENGLAND	230	240	-	273	248	-	6	1	7
Maine	7	2	-	19	12	-	-	-	-
N.H.	5	2	-	7	17	-	-	-	-
Vt.	-	1	-	4	3	-	-	-	-
Mass.	121	144	-	168	134	-	5	1	4
R.I.	7	8	-	21	19	-	-	-	-
Conn.	90	83	-	56	63	-	1	-	3
MID ATLANTIC	1,431	1,631	-	1,514	1,590	1	16	-	162
Upstate N.Y.	108	141	-	250	246	-	6	-	39
N.Y. City	883	983	-	768	884	1	4	-	-
N.J.	307	301	-	170	339	-	5	-	8
Pa.	133	206	-	326	341	-	1	-	115
E.N. CENTRAL	497	549	1	1,049	1,127	-	11	11	53
Ohio	61	110	1	194	241	-	3	10	10
Ind.	36	63	-	126	121	-	3	-	6
Ill.	267	154	-	450	452	-	1	-	10
Mich.	109	187	-	222	244	-	3	1	4
Wis.	24	35	-	57	69	-	1	-	23
W.N. CENTRAL	109	194	-	217	242	14	3	1	370
Minn.	26	54	-	41	40	1	3	-	66
Iowa	14	10	-	34	32	-	-	-	81
Mo.	48	104	-	97	113	12	-	-	19
N. Dak.	-	2	-	2	6	-	-	1	47
S. Dak.	4	-	-	12	8	-	-	-	110
Nebr.	5	8	-	10	14	1	-	-	19
Kans.	12	16	-	21	29	-	-	-	28
S. ATLANTIC	2,569	3,548	1	1,733	1,830	5	11	47	578
Del.	16	10	-	15	24	1	-	-	-
Md.	159	235	-	159	211	-	2	5	289
D.C.	154	133	-	78	60	-	-	-	-
Va.	135	187	-	145	175	-	2	3	79
W. Va.	4	9	-	42	65	-	-	1	12
N.C.	278	351	1	209	280	4	1	21	2
S.C.	335	333	-	199	218	-	-	15	33
Ga.	-	619	-	279	240	-	-	1	82
Fla.	1,488	1,671	-	607	557	-	6	1	81
E.S. CENTRAL	953	725	-	740	808	2	3	9	103
Ky.	33	49	-	136	176	-	1	-	15
Tenn.	253	204	-	233	256	2	-	4	23
Ala.	291	259	-	247	252	-	2	4	63
Miss.	376	213	-	124	124	-	-	1	2
W.S. CENTRAL	2,598	2,804	-	883	940	7	6	31	427
Ark.	126	85	-	101	102	1	-	7	65
La.	438	524	-	124	135	-	-	-	8
Okla.	72	77	-	115	95	6	-	19	53
Tex.	1,962	2,118	-	543	608	-	6	5	301
MOUNTAIN	330	282	1	216	216	7	5	4	174
Mont.	1	1	-	29	10	2	-	2	89
Idaho	3	12	-	11	13	-	-	1	-
Wyo.	4	3	-	5	-	-	-	1	11
Colo.	77	62	1	27	25	1	4	-	3
N. Mex.	45	37	-	39	45	2	1	-	2
Ariz.	179	117	-	93	92	-	-	-	69
Utah	3	9	-	6	16	2	-	-	-
Nev.	18	41	-	6	15	-	-	-	-
PACIFIC	1,717	1,836	2	1,695	1,670	2	57	1	222
Wash.	51	62	-	95	84	-	-	-	1
Oreg.	37	52	-	58	65	1	-	-	-
Calif.	1,595	1,685	1	1,415	1,402	1	56	1	221
Alaska	1	3	-	51	28	-	-	-	-
Hawaii	33	34	1	76	91	-	1	-	-
Guam	2	-	U	12	22	-	-	-	-
P.R.	363	370	-	138	185	-	1	-	15
V.I.	1	6	U	1	3	-	-	-	-
Pac. Trust Terr.	13	-	U	16	-	-	-	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending June 1, 1985 (22nd Week)

Reporting Area	All Causes, By Age (Years)						P&I** Total
	All Ages	≥65	45-64	25-44	1-24	<1	
NEW ENGLAND	679	472	132	34	17	24	56
Boston, Mass.	184	121	39	9	5	10	20
Bridgeport, Conn.	40	28	8	3	1	-	-
Cambridge, Mass.	30	22	6	2	-	-	5
Fall River, Mass.	28	21	7	-	-	-	-
Hartford, Conn.	49	28	10	5	2	4	2
Lowell, Mass.	31	28	2	1	-	-	4
Lynn, Mass.	23	22	-	-	1	-	2
New Bedford, Mass.	24	20	1	1	1	1	2
New Haven, Conn.	52	31	13	3	2	3	7
Providence, R.I.	76	51	19	3	2	1	3
Somerville, Mass.	12	8	2	2	-	-	1
Springfield, Mass.	42	32	6	2	-	2	4
Waterbury, Conn.	28	19	8	-	1	-	2
Worcester, Mass.	60	41	11	3	2	3	4
MID ATLANTIC	2,423	1,598	515	191	55	64	106
Albany, N.Y.	61	45	9	4	2	1	-
Allentown, Pa.	21	13	6	2	-	-	-
Buffalo, N.Y.	124	81	27	5	5	6	9
Camden, N.J.	41	23	11	2	3	2	-
Elizabeth, N.J.	27	23	2	1	-	1	2
Erie, Pa.†	37	28	6	4	1	-	2
Jersey City, N.J.	41	28	6	5	1	1	2
N.Y. City, N.Y.	1,278	839	259	120	29	31	46
Newark, N.J.	66	31	17	15	2	1	6
Paterson, N.J.	29	15	9	3	-	2	2
Philadelphia, Pa.	291	178	83	17	3	10	22
Pittsburgh, Pa.†	44	31	11	-	1	1	1
Reading, Pa.	29	21	8	-	-	-	-
Rochester, N.Y.	126	86	26	6	4	4	3
Schenectady, N.Y.	13	12	1	-	-	-	1
Scranton, Pa.†	22	17	3	-	2	-	1
Syracuse, N.Y.	87	61	18	3	2	3	2
Trenton, N.J.	35	29	4	1	-	1	-
Utica, N.Y.	23	15	7	1	-	-	2
Yonkers, N.Y.	28	24	2	2	-	-	5
E.N. CENTRAL	2,106	1,434	382	121	83	105	69
Akron, Ohio	49	35	9	2	3	-	3
Canton, Ohio	30	19	10	1	-	-	2
Chicago, Ill.§	553	462	11	26	18	37	16
Cincinnati, Ohio	64	41	9	3	3	8	4
Cleveland, Ohio	138	87	27	10	7	7	3
Columbus, Ohio	129	70	34	10	5	10	3
Dayton, Ohio	118	71	32	8	5	2	1
Detroit, Mich.	213	115	46	25	15	12	2
Evansville, Ind.	40	27	9	1	2	1	1
Fort Wayne, Ind.	51	36	12	2	-	1	2
Gary, Ind.	11	6	3	1	1	-	-
Grand Rapids, Mich.	62	37	16	2	2	5	1
Indianapolis, Ind.	162	100	35	12	8	7	4
Madison, Wis.	35	19	8	1	5	2	4
Milwaukee, Wis.	131	83	36	5	2	5	6
Peoria, Ill.	58	43	7	2	3	3	6
Rockford, Ill.	31	22	7	2	-	-	3
South Bend, Ind.	51	34	12	3	2	-	3
Toledo, Ohio	113	79	25	5	3	1	5
Youngstown, Ohio	67	48	14	-	1	4	-
W.N. CENTRAL	611	416	129	36	14	15	17
Des Moines, Iowa	50	32	13	1	3	2	-
Duluth, Minn.	36	27	6	2	-	1	4
Kansas City, Kans.	16	11	3	1	-	1	-
Kansas City, Mo.	94	59	23	8	2	2	5
Lincoln, Nebr.	18	16	2	-	-	-	2
Minneapolis, Minn.	61	37	12	7	3	2	1
Omaha, Nebr.	84	55	21	2	4	2	3
St. Louis, Mo.	151	111	28	8	1	2	-
St. Paul, Minn.	59	41	11	4	1	2	2
Wichita, Kans.	42	27	10	3	1	1	-
S. ATLANTIC	1,123	684	275	87	39	34	49
Atlanta, Ga.	122	77	29	11	4	1	2
Baltimore, Md.	203	126	54	14	8	1	7
Charlotte, N.C.	79	39	21	10	5	3	5
Jacksonville, Fla.	85	56	18	5	3	3	6
Miami, Fla.	88	51	25	7	4	1	-
Norfolk, Va.	48	26	12	8	1	1	4
Richmond, Va.	68	33	22	6	3	4	4
Savannah, Ga.	55	36	13	4	-	2	6
St. Petersburg, Fla.	82	68	11	3	-	-	4
Tampa, Fla.	83	53	18	4	2	3	5
Washington, D.C.	194	110	47	14	8	15	5
Wilmington, Del.	16	9	5	1	1	-	1
E.S. CENTRAL	639	439	139	28	18	15	27
Birmingham, Ala.	105	62	24	11	3	5	-
Chattanooga, Tenn.	57	43	11	1	2	-	5
Knoxville, Tenn. §	85	81	-	1	2	1	5
Louisville, Ky.	93	60	24	5	1	3	2
Memphis, Tenn.	116	76	32	4	3	1	4
Mobile, Ala.	63	37	19	3	4	-	1
Montgomery, Ala.	27	22	5	-	-	-	3
Nashville, Tenn.	93	58	24	3	3	5	7
W.S. CENTRAL	1,098	756	177	64	56	45	48
Austin, Tex.	40	24	7	6	1	2	1
Baton Rouge, La.	46	38	7	-	-	1	5
Corpus Christi, Tex.	22	13	8	-	-	1	-
Dallas, Tex.	152	87	40	14	4	7	8
El Paso, Tex.	48	30	11	1	5	1	4
Fort Worth, Tex.	83	38	28	7	7	3	5
Houston, Tex. §	321	271	4	13	16	17	8
Little Rock, Ark.	72	47	12	6	3	4	5
New Orleans, La.	81	52	13	5	7	4	-
San Antonio, Tex.	138	89	29	8	8	4	7
Shreveport, La.	21	14	5	2	-	-	2
Tulsa, Okla.	74	53	13	2	5	1	3
MOUNTAIN	582	352	132	52	22	24	27
Albuquerque, N.Mex.	70	43	17	7	-	3	3
Colo. Springs, Colo.	28	21	2	3	2	-	1
Denver, Colo.	117	68	27	9	9	4	3
Las Vegas, Nev.	81	49	22	6	3	1	7
Ogden, Utah	18	11	5	1	1	-	1
Phoenix, Ariz.	111	66	21	11	3	10	2
Pueblo, Colo.	18	10	5	1	1	1	3
Salt Lake City, Utah	50	28	13	5	2	4	1
Tucson, Ariz.	89	58	20	9	1	1	6
PACIFIC	1,540	993	357	111	39	38	107
Berkeley, Calif.	15	10	5	-	-	-	-
Fresno, Calif.	86	66	8	8	3	4	18
Glendale, Calif.	13	9	2	-	1	1	-
Honolulu, Hawaii	69	44	21	3	1	-	8
Long Beach, Calif.	80	51	18	5	5	1	4
Los Angeles, Calif.	329	206	74	31	9	7	14
Oakland, Calif.	54	34	17	3	-	-	3
Pasadena, Calif.	17	14	2	1	-	-	2
Portland, Oreg.	78	61	10	4	1	2	4
Sacramento, Calif.	152	84	48	12	4	4	17
San Diego, Calif.	136	90	32	7	3	4	12
San Francisco, Calif.	126	79	26	16	1	4	2
San Jose, Calif.	124	85	25	8	3	3	9
Seattle, Wash.	128	77	32	12	3	4	3
Spokane, Wash.	55	34	15	2	3	1	4
Tacoma, Wash.	78	49	22	2	2	3	7
TOTAL	10,801††	7,144	2,218	724	343	364	506

*Mortality data in this table are voluntarily reported from 121 cities in the United States, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

**Pneumonia and influenza.

† Because of changes in reporting methods in these 3 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

††Total includes unknown ages.

§ Data not available. Figures are estimates based on average of past 4 weeks.

ACIP: Viral Hepatitis – Continued

IG may have some effect in preventing clinical hepatitis B following percutaneous exposures and can be considered as an alternative to HBIG when it is not possible to obtain HBIG.

Recommendations on postexposure prophylaxis are based on the efficacy data discussed above and on the likelihood of future HBV exposure of the person requiring treatment. In perinatal exposure and percutaneous exposure of high-risk health-care personnel, a regimen combining HBIG with hepatitis B vaccine will provide both short- and long-term protection, will be less costly than the two-dose HBIG treatment alone, and is the treatment of choice.

Perinatal exposure. One of the most efficient modes of HBV transmission is from mother to infant during birth. If the mother is positive for both HBsAg and HBeAg, about 70%-90% of infants will become infected, and up to 90% of these infected infants will become HBV carriers. If the HBsAg-positive carrier mother is HBeAg-negative, or if anti-HBe is present, transmission occurs less frequently and rarely leads to the HBV carrier state. However, severe acute disease, including fatal fulminant hepatitis in the neonate, has been reported (*32,33*). Prophylaxis of infants from all HBsAg-positive mothers is recommended, regardless of the mother's HBeAg or anti-HBe status.

The efficacy of a combination of HBIG plus the hepatitis B vaccine series has been confirmed in recent studies. Although the following regimen is recommended (Table 3), other schedules have also been effective (*25-27,34*). The major consideration for all these regimens is the need to give HBIG as soon as possible after delivery.

HBIG (0.5 ml [10 μg]) should be administered intramuscularly after physiologic stabilization of the infant and preferably within 12 hours of birth. Hepatitis B vaccine should be administered intramuscularly in three doses of 0.5 ml (10 μg) each. The first dose should be given concurrently with HBIG but at a different site. If vaccine is not available at birth, the first vaccine dose may be given within 7 days of birth. The second and third doses should be given 1 month and 6 months, respectively, after the first. Testing for HBsAg and anti-HBs is recommended at 12-15 months to monitor the final success or failure of therapy. If HBsAg is not detectable, and anti-HBs is present, the child has been protected. Testing for anti-HBc is not useful, since maternal anti-HBc may persist for more than 1 year; the utility of testing for IgM anti-HBc is currently being evaluated. HBIG administered at birth should not interfere with oral polio and diphtheria-tetanus-pertussis vaccines administered at 2 months of age.

Maternal screening. Since efficacy of the treatment regimen depends on administering HBIG on the day of birth, it is vital that HBsAg-positive mothers be identified before delivery. Mothers belonging to groups known to be at high risk of acquiring HBV infection (Table 4)

TABLE 3. Hepatitis B virus postexposure recommendations

	HBIG		Vaccine	
Exposure	Dose	Recommended timing	Dose	Recommended timing
Perinatal	0.5 ml IM	Within 12 hours	0.5 ml (10 μg) IM of birth	Within 12 hours of birth*; repeat at 1 and 6 months
Sexual	0.06 ml/kg IM	Single dose within 14 days of sexual contact	†	—

*The first dose can be given the same time as the HBIG dose but at a different site.

†Vaccine is recommended for homosexual men and for regular sexual contacts of HBV carriers and is optional in initial treatment of heterosexual contacts of persons with acute HBV.

ACIP: Viral Hepatitis – Continued

should be tested routinely for HBsAg during a prenatal visit. If a mother belonging to a high-risk group has not been screened prenatally, HBsAg screening should be done at the time of delivery, or as soon as possible thereafter, and the infant treated as above if the mother is HBsAg-positive. If the mother is identified as HBsAg-positive more than 1 month after giving birth, the infant should be screened for HBsAg, and if negative, treated with hepatitis B vaccine and HBIG.

The appropriate obstetric and pediatric staff should be notified directly of HBsAg-positive mothers, so the staff may take appropriate precautions to protect themselves and other patients from infectious material, blood, and secretions, and so the neonate may receive therapy without delay after birth.

Acute exposure to blood that contains (or might contain) HBsAg. For accidental percutaneous or permucosal exposure to blood that is known to contain or might contain HBsAg, the decision to provide prophylaxis must take into account several factors: (1) the hepatitis B vaccination status of the exposed person; (2) whether the source of blood is known or unknown; and (3) whether the HBsAg status of the source is known or unknown. Such exposures usually occur in persons who are candidates for hepatitis B vaccine; for any exposure in a person not previously vaccinated, hepatitis B vaccination is recommended.

The following outline and table summarize prophylaxis for percutaneous (needlestick or bite), ocular, or mucous-membrane exposure to blood according to the source of exposure and vaccination status of the exposed person (Table 5). For greatest effectiveness, passive prophylaxis with HBIG (or IG) should be given as soon as possible after exposure (its value beyond 7 days of exposure is unclear).

1. *Exposed person not previously vaccinated.* Hepatitis B vaccination should be considered the treatment of choice. Depending on the source of the exposure, HBsAg testing of the source and additional prophylaxis of the exposed person may be warranted (see below). Screening the exposed person for immunity should be considered if such screening is cost-effective (as discussed in preexposure prophylaxis) and if this will not delay treatment beyond 7 days.
   a. *Source known HBsAg-positive.* A single dose of HBIG (0.06 ml/kg) should be given as soon as possible after exposure and within 24 hours, if possible. The first dose of hepatitis B vaccine (20 μg) should be given intramuscularly at a separate site within 7 days of exposure, and the second and third doses given 1 month and 6 months later (Table 5).[†] If HBIG cannot be obtained, IG in an equivalent dosage (0.06 ml/kg) may provide some benefit.

[†]For persons who are not given hepatitis B vaccine, a second dose of HBIG should be given 1 month after the first dose.

TABLE 4. Women for whom prenatal HBsAg screening is recommended

1. Women of Asian, Pacific island, or Alaskan Eskimo descent, whether immigrant or U.S.-born.
2. Women born in Haiti or sub-Saharan Africa.
3. Women with histories of:
   a. Acute or chronic liver disease.
   b. Work or treatment in a hemodialysis unit.
   c. Work or residence in an institution for the mentally retarded.
   d. Rejection as a blood donor.
   e. Blood transfusion on repeated occasions.
   f. Frequent occupational exposure to blood in medico-dental settings.
   g. Household contact with an HBV carrier or hemodialysis patient.
   h. Multiple episodes of venereal diseases.
   i. Percutaneous use of illicit drugs.

ACIP: Viral Hepatitis – Continued

b. *Source known, HBsAg status unknown.* The following guidelines are suggested based on the relative probability that the source is HBsAg-positive and on the consequent risk of HBV transmission:

(1) *High risk that the source is HBsAg-positive, such as patients with a high risk of HBV carriage (Table 2) or patients with acute or chronic liver disease (serologically undiagnosed).* The exposed person should be given the first dose of hepatitis B vaccine (20 μg) within 1 week of exposure and vaccination completed as recommended. The source person should be tested for HBsAg. If positive, the exposed person should be given HBIG (0.06 ml/kg) if within 7 days of exposure.

(2) *Low risk that the source is positive for HBsAg.* The exposed person should be given the first dose of hepatitis B vaccine (20 μg) within 1 week of exposure and vaccination completed as recommended. Testing of the source person is not necessary.

c. *Source unknown.* The exposed person should be given the first dose of hepatitis B vaccine (20 μg) within 7 days of exposure and vaccination completed as recommended.

2. *Exposed person previously vaccinated against hepatitis B.* For percutaneous exposures to blood in persons who have previously received one or more doses of hepatitis B vaccine, the decision to provide additional prophylaxis will depend on the source of exposure and on whether the vaccinated person has developed anti-HBs following vaccination.

a. *Source known HBsAg-positive.* The exposed person should be tested for anti-HBs unless he/she has been tested within the last 12 months. If the exposed person has adequate[§] antibody, no additional treatment is indicated.

[§]Adequate antibody is 10 SRU or more by RIA or positive by EIA.

TABLE 5. Recommendations for hepatitis B prophylaxis following percutaneous exposure

Source	Exposed person	
	Unvaccinated	Vaccinated
HBsAg-positive	1. HBIG x 1 immediately* 2. Initiate HB vaccine† series.	1. Test exposed person for anti-HBs.§ 2. If inadequate antibody,¶ HBIG (x1) immediately plus HB vaccine booster dose.
Known source		
High-risk HBsAg-positive	1. Initiate HB vaccine series 2. Test source for HBsAg. If positive, HBIG x 1.	1. Test source for HBsAg only if exposed is vaccine nonresponder; if source is HBsAg-positive, give HBIG x 1 immediately plus HB vaccine booster dose
Low-risk HBsAg-positive	Initiate HB vaccine series.	Nothing required.
Unknown source	Initiate HB vaccine series.	Nothing required.

*HBIG dose 0.06 ml/kg IM.

†HB vaccine dose 20 μg IM for adults; 10 μg IM for infants or children under 10 years of age. First dose within 1 week; second and third doses, 1 and 6 months later.

§ See text for details.

¶Less than 10 SRU by RIA, negative by EIA.

ACIP: Viral Hepatitis – Continued

(1) If the exposed person has not completed vaccination and has inadequate levels of antibody, one dose of HBIG (0.06 ml/kg) should be given immediately and vaccination completed as scheduled.

(2) If the exposed person has inadequate antibody on testing or has previously not responded to vaccine, one dose of HBIG should be given immediately and a booster dose of vaccine (1 ml or 20 μg) given at a different site.

(3) If the exposed person shows inadequate antibody on testing but is known to have had adequate antibody in the past, a booster dose of hepatitis B vaccine (1 ml or 20 μg) should be given.

b. *Source known, HBsAg status unknown.*

(1) *High risk that the source is HBsAg-positive.* Additional prophylaxis is necessary only if the exposed person is a known vaccine nonresponder. In this circumstance, the source should be tested for HBsAg and, if positive, the exposed person treated with one dose of HBIG (0.06 ml/kg) immediately and a booster dose of vaccine (1 ml or 20 μg) at a different site. In other circumstances, screening of the source for HBsAg and the exposed person for anti-HBs is not routinely recommended, because the actual risk of HBV infection is very low (less than 1 per 1,000).¶

(2) *Low risk that the source is HBsAg-positive.* The risk of HBV infection is minimal. Neither testing of the source for HBsAg, nor testing of the exposed person for anti-HBs, is recommended.

c. *Source unknown.* The risk of HBV infection is minimal. No treatment is indicated.

Sexual contacts of persons with acute HBV infection. Sexual contacts of HBsAg-positive persons are at increased risk of acquiring HBV infection, and HBIG has been shown to be 75% effective in preventing such infections (*31*). Because data are limited, the period after sexual exposure during which HBIG is effective is unknown, but extrapolation from other settings makes it unlikely that this period would exceed 14 days. Prescreening sexual partners for susceptibility before treatment is recommended if it does not delay treatment beyond 14 days after last exposure. Testing for anti-HBc is the most efficient prescreening test to use in this population group.

A single dose of HBIG (0.06 ml/kg) is recommended for susceptible individuals who have had sexual contact with an HBsAg-positive person, if HBIG can be given within 14 days of the last sexual contact, and for persons who will continue to have sexual contact with an individual with acute hepatitis B before loss of HBsAg in that individual. In exposures between heterosexuals, hepatitis B vaccination may be initiated at the same time as HBIG prophylaxis; such treatment may improve efficacy of postexposure treatment. However, since 90% of persons with acute HBV infection become HBsAg-negative within 15 weeks of diagnosis, the potential for repeated exposure to HBV is limited. Hepatitis B vaccine is, therefore, optional in initial treatment for such exposures. If vaccine is not given, a second dose of HBIG should be given if the index patient remains HBsAg-positive for 3 months after detection. If the index patient is a known carrier or remains positive for 6 months, hepatitis B vaccine should be offered to regular sexual contacts. For exposures among homosexual men, the hepatitis B vaccine series should be initiated at the time HBIG is given, since hepatitis B vaccine is recommended for all susceptible homosexual men. Additional doses of HBIG are unnecessary if vaccine is given. IG

¶Estimated by multiplying the risk of vaccine nonresponse in the exposed person (.10) by the risk of the needle source being HBsAg-positive (.05) by the risk of HBV infection in a susceptible person having an HBsAg-positive needle-stick injury (.20).

ACIP: Viral Hepatitis – Continued

is an alternative to HBIG when it is not possible to obtain HBIG.

Household contacts of persons with acute HBV infection. Prophylaxis for other household contacts of persons with acute HBV infection is not indicated unless they have had identifiable blood exposure to the index case, such as by sharing toothbrushes or razors. Such exposures should be treated similarly to sexual exposures. If the index patient becomes a hepatitis B carrier, all household contacts should be given hepatitis B vaccine.

DELTA HEPATITIS

The delta virus (also known as hepatitis D virus [HDV] by some investigators) is a defective virus that may only cause infection in the presence of active HBV infection. The delta virus has been characterized as a particle of 35-37 nm in size, consisting of RNA (mw 500,000) as genetic material and an internal protein antigen (delta-antigen), coated with HBsAg as the surface protein (*3*). Infection may occur as either coinfection with hepatitis B or superinfection of a hepatitis B carrier, each of which usually cause an episode of acute hepatitis. Coinfection usually resolves, while superinfection frequently causes chronic delta infection and chronic active hepatitis. Both types of infection may cause fulminant hepatitis.

Delta infection may be diagnosed by detection of delta-antigen in serum during early infection and by the appearance of delta antibody during or after infection. Routes of delta transmission appear to be similar to those of hepatitis B. In the United States, delta infection occurs most commonly among persons at high risk of acquiring HBV infection, such as drug addicts and hemophilia patients.

A test for detection of delta antibody is expected to be commercially available soon. Other tests (delta antigen, IgM anti-delta) are available only in research laboratories.

Since the delta virus is dependent on hepatitis B for replication, prevention of hepatitis B infection, either preexposure or postexposure, will suffice to prevent delta infection in a person susceptible to hepatitis B. Known episodes of perinatal, sexual, or percutaneous exposure to sera or persons positive for both HBV and delta virus should be treated exactly as such exposures to hepatitis B alone.

Persons who are HBsAg carriers are at risk of delta infection, especially if they participate in activities that put them at high risk of repeated exposure to hepatitis B (parenteral drug abuse, homosexuality). However, at present there are no products available that might prevent delta infection in HBsAg carriers either before or after exposure.

NON-A, NON-B HEPATITIS

United States. Non-A, non-B hepatitis that presently occurs in the United States has epidemiologic characteristics similar to those of hepatitis B, occurring most commonly following blood transfusion and parenteral drug abuse. Multiple episodes of non-A, non-B hepatitis have been observed in the same individuals and may be due to different agents. Chronic hepatitis following acute non-A, non-B hepatitis infection varies in frequency from 20% to 70%. Experimental studies in chimpanzees have confirmed the existence of a carrier state, which may be present in up to 8% of the population.

Although several studies have attempted to assess the value of prophylaxis with IG against non-A, non-B hepatitis, the results have been equivocal, and no specific recommendations can be made (*35,36*). However, for persons with percutaneous exposure to blood from a patient with non-A, non-B hepatitis, it may be reasonable to administer IG (0.06 ml/kg) as soon as possible after exposure.

Epidemic (fecal-oral) non-A, non-B hepatitis. In recent years, epidemics of non-A, non-B hepatitis spread by water or close personal contact have been reported from several areas of Southeast Asia (Indian subcontinent, Burma) and north Africa (*2*). Such epidemics generally

ACIP: Viral Hepatitis – Continued

affect adults and cause unusually high mortality in pregnant women. The disease has been transmitted to experimental animals, and candidate viruses have been identified; however, no serologic tests have yet been developed (*37*).

Epidemic non-A, non-B hepatitis has not been recognized in the United States or western Europe, and it is unknown whether the causative agent is present in these areas.

Travelers to areas having epidemic non-A, non-B hepatitis may be at some risk of acquiring this disease by close contact or by contaminated food or water. The value of IG in preventing this infection is unknown. The best prevention of infection is to avoid potentially contaminated food or water, as with hepatitis A and other enteric infections.

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ACIP: Viral Hepatitis — Continued

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International Notes

Pregnancy Risk Factor Assessment — North Area of Santiago, Chile, 1982-1983

To guide public health programs in the north area of metropolitan Santiago, Chile, and to estimate the prevalence of pregnancy risk factors, the University of Chile School of Public Health surveyed 220 women in 1982-1983. All had delivered single live-born infants at a hospital in the area. Home interviews of randomly selected mothers were conducted by senior medical students, with all selected mothers being interviewed. Mothers were asked about prenatal activities, such as smoking and drinking, their previous contraceptive practices, and other perinatal and postnatal questions (*1,2*). Only data on prenatal risk factors are presented here.

When compared with the fathers, mothers were younger, less well educated, and less likely to work outside the home (Table 6). Seventy-one percent of women were married, and 19% were living in consensual union. The selected infant was the mother's first live birth for

Pregnancy Risk Factor Assessment — Continued

42% of the women; the second or third live birth for 42%; and the fourth or more for 16%. Of these mothers, 18% reported having had at least one prior abortion, and 5% had experienced the death of at least one child. Regarding contraceptive use during the time of conception, 86% of the mothers had not used a birth control method, and 14% had used an intrauterine device, birth control pills, or some other method.

The behavioral risk factors that were measured included alcohol consumption, smoking, prenatal care, and medications taken during pregnancy. Alcohol use was reported by 25% of the women, with one-third reporting that they had been "drunk on an infrequent basis." Wine was the preferred beverage, although other beverages were consumed. Forty-nine percent reported smoking cigarettes during pregnancy: 18% of these occasionally smoked; 71% smoked fewer than 10 cigarettes per day; 5% smoked 10-20 cigarettes per day; and 6% smoked more than 20 cigarettes per day. A large majority of the mothers sought prenatal care during their most recent pregnancy. In terms of medication usage, 67% of mothers reported taking multivitamins; 22% took iron; 11% took calcium; and 51% took some other medication.

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Editorial Note: When directing reproductive health programs, rapid assessment of the needs of the population being served is essential. Assessment of program clientele can easily be incorporated, but assessment of those not participating can be difficult. In select areas, the above study proposes a simple, repeatable methodology to measure the prevalence of risk fac-

TABLE 6. Ages, educational status, and occupations of surveyed parents — north area of Santiago, Chile, 1982-1983

Characteristic	Maternal (%)	Paternal (%)
Age (yrs.)		
15-19	17.5	5.8
20-29	60.0	61.0
30-39	21.0	23.2
≥ 40	1.5	10.0
Total	**100.0**	**100.0**
Educational status		
Higher education	1.4	3.2
Technical education	4.5	3.6
Attended high school	49.6	52.3
Attended grammar school	42.7	36.8
Illiterate	0.4	0.0
Did not respond	1.4	4.1
Total	**100.0**	**100.0**
Occupation		
Work at home	85.9	*
Blue collar	2.7	28.6
White collar	0.9	13.2
Trading	6.8	12.3
Unemployed	2.3	24.1
Other	1.4	21.8
Total	**100.0**	**100.0**

*Working at home was an option only for mothers.

Pregnancy Risk Factor Assessment — Continued

tors in women giving birth, regardless of their program participation. The method requires four conditions: (1) that the program area have a high proportion of in-hospital deliveries; (2) that most hospitals handling program area deliveries be included; (3) that program area deliveries be distinguishable from deliveries not in the program area; and (4) that a systematic or random method to select mothers for interview be available. This sampling frame can also be modified to include all registered births. The National Center for Health Statistics uses this methodology when conducting the periodic National Natality Survey. However, the sample selected by either method will not represent all pregnancies, since women with miscarriages, induced abortions, and fetal deaths are not included.

This survey had two major accomplishments. The first, obtaining information about the prevalence of selected risk factors among mothers and their newborns in the area north of Santiago, resulted in an immediate benefit: prenatal-care practitioners in the outpatient clinic were notified of the low percentage of mothers taking iron during pregnancy (22%). The second accomplishment, teaching medical students community-based epidemiologic study methods, resulted in a practical public health experience. Moreover, the community's respect for the medical students was the reason attributed for the survey's 100% response rate. As demonstrated by these accomplishments, this survey method provides one way to complete the programmatic assessment needed to help attain the goal of the World Health Organization of "Health for All by the Year 2000" (*3*).

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Epidemiologic Notes and Reports

Reported Measles Cases — United States, Past 4 Weeks

The following states have reported measles during the past 4 weeks: Arizona, California, Connecticut, Florida, Hawaii, Idaho, Illinois, Louisiana, Maryland, Massachusetts, Michigan, Montana, upstate New York, North Carolina, Ohio, Pennsylvania, Texas, Virginia, and West Virginia; New York City has also reported measles.

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The data in this report are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the succeeding Friday.

The editor welcomes accounts of interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials. Such reports and any other matters pertaining to editorial or other textual considerations should be addressed to: ATTN: Editor, *Morbidity and Mortality Weekly Report*, Centers for Disease Control, Atlanta, Georgia 30333.

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